

**SUBSTITUTE SPECIFICATION****Electromagnetic Ultrasonic Probe****BACKGROUND OF THE INVENTION**

**[0001]** The present invention relates to an electromagnetic ultrasonic probe for coupling media-free generation and reception of ultrasonic waves in the form of linearly polarized transverse waves in a workpiece, and therefrom. Such a type ultrasonic probe provides a unit which generates ultrasonic waves inside the workpiece having a transmission coil arrangement to which a high-frequency voltage can be applied to generate a high-frequency field. A premagnetizing unit ensures generation of a quasi-static magnetic field superimposed on the high-frequency magnetic field in the workpiece. Furthermore, to detect ultrasonic waves, a unit is provided to receive the ultrasonic waves. The ultrasonic reception unit is provided with a reception coil arrangement which can be connected to an evaluation unit.

**[0002]** In order to prevent the filigree transmission coil and reception coil arrangements from suffering mechanical damage due to direct contact with the surface of the workpiece, the arrangements are torus-shaped on at least one partially toroidally magnetic core, which is provided with at least two front ends that can be turned to face the workpiece. The high-frequency magnetic fields can be coupled into, and out of, the workpiece via these two front ends, permitting in this manner the coil arrangements to be disposed on the surface of the workpiece at a distance from each other. Nonetheless the high-frequency magnetic fields required for the generation and detection of ultrasonic waves inside the workpiece are effectively coupled into, and out of, the workpiece via a partially toroidal-shaped magnetic core.

**[0003]** Such ultrasonic probes permit generation and reception of linear polarized transverse waves which are irradiated perpendicularly under the probe into the workpiece, and are received from this direction and oscillate perpendicular to their propagation direction in a plane. Technical fields of application of such